Using scatterometer-measured vector winds to study high-impact weather events

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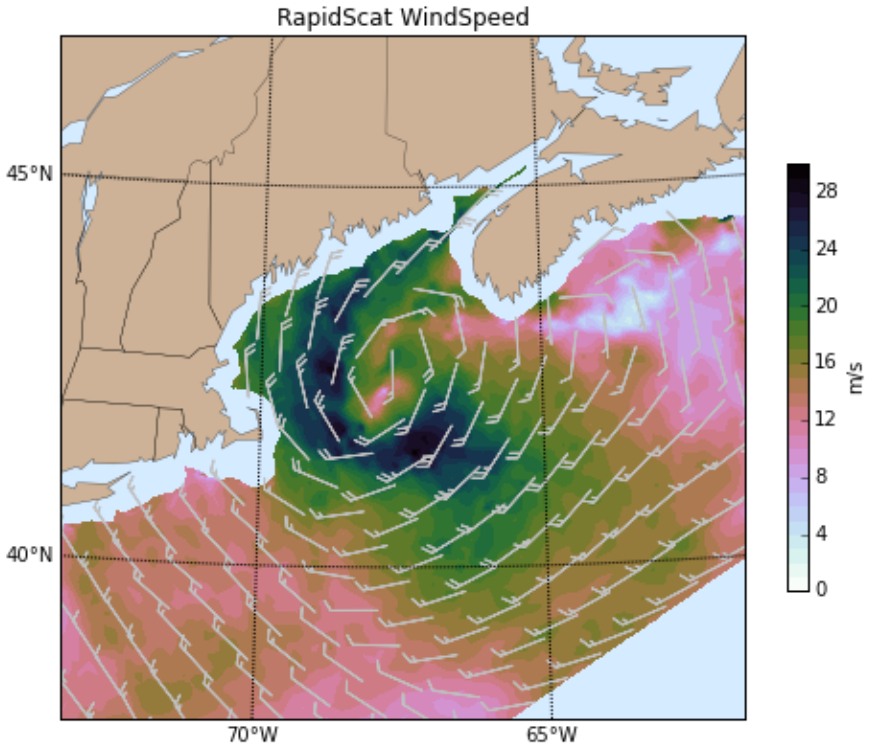
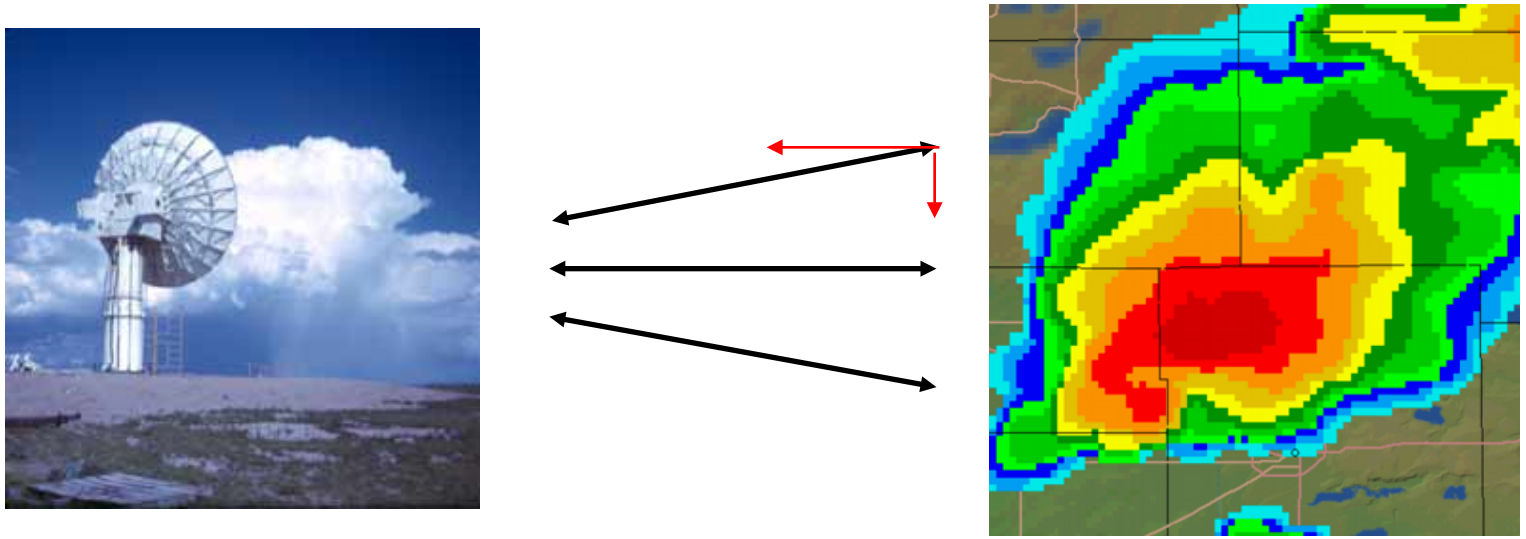


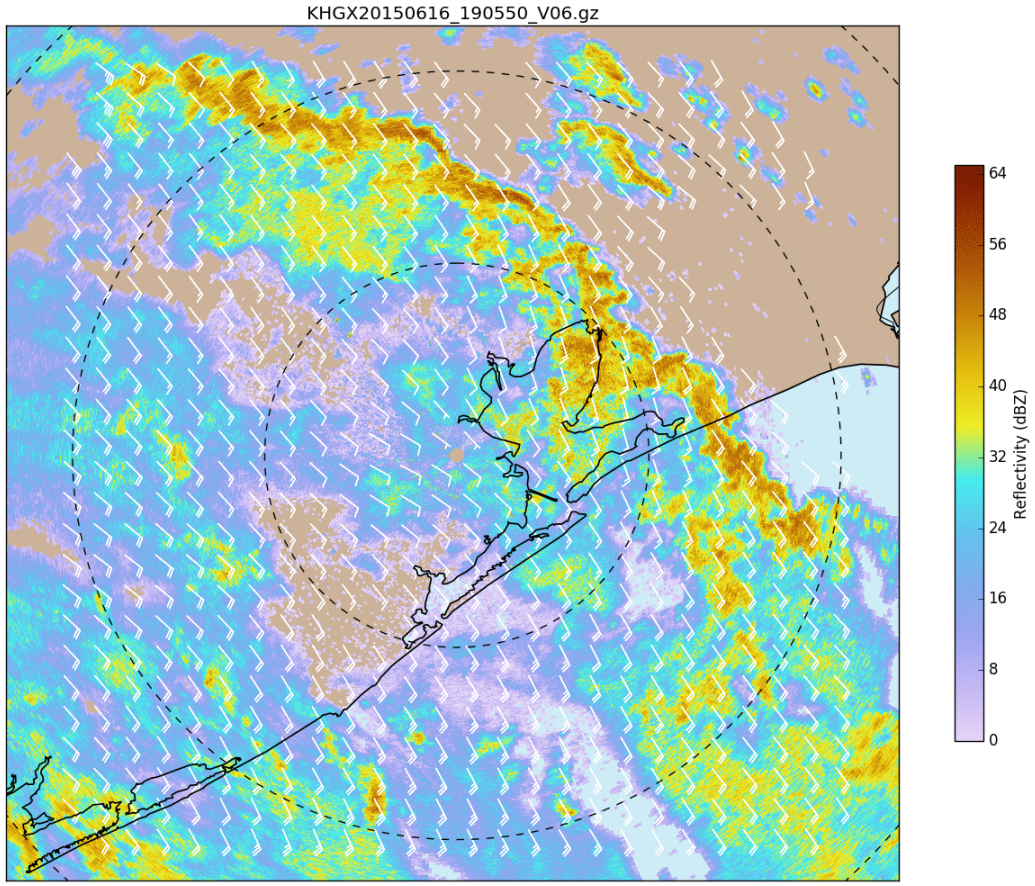
In this short update talk, we will examine the utility of comparing scatterometer overpasses with single-Doppler wind retrievals from coastal/island radars

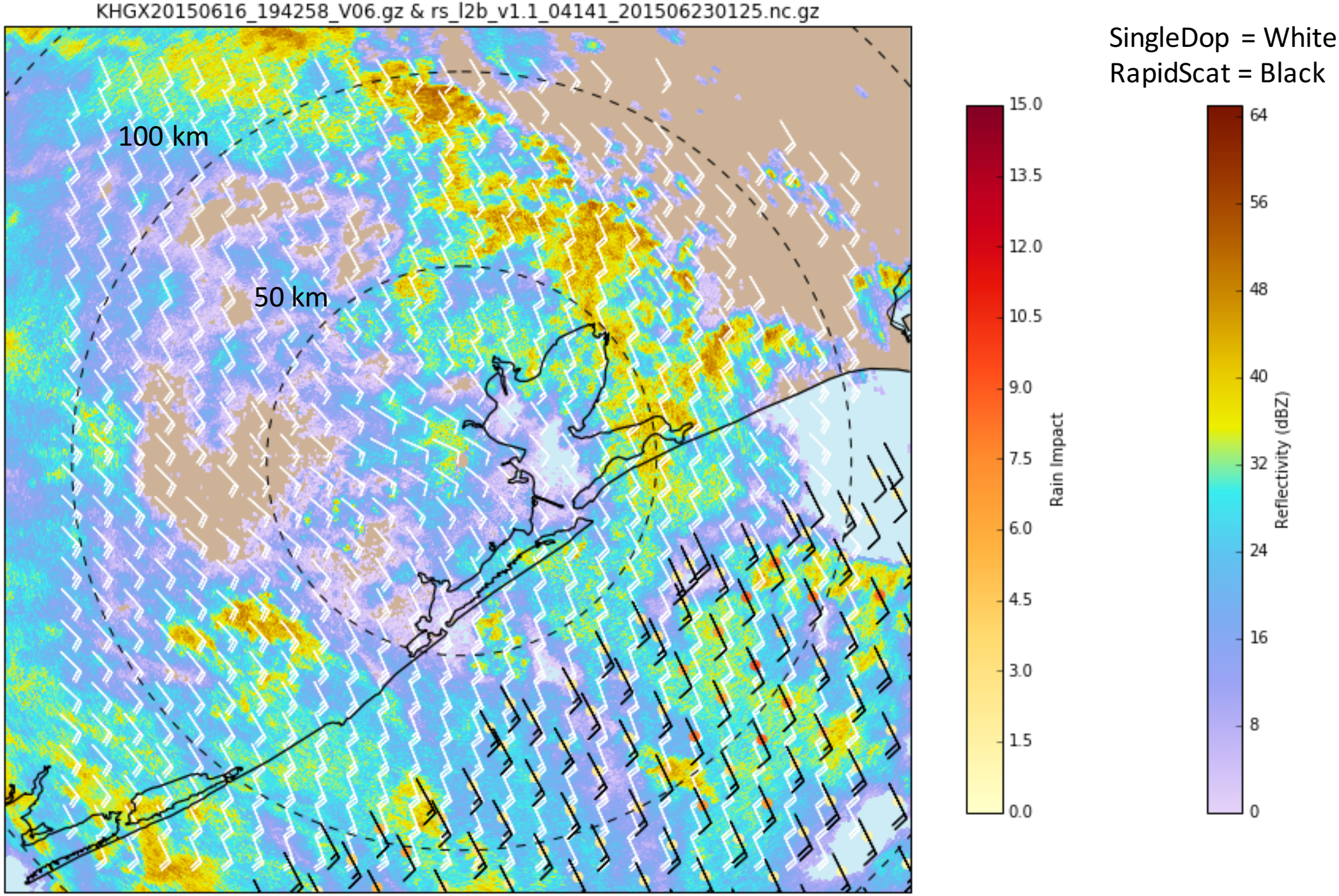


By using nearby azimuths to retrieve tangential wind, we can retrieve low-level 2D winds on the conical radar PPI "surface"

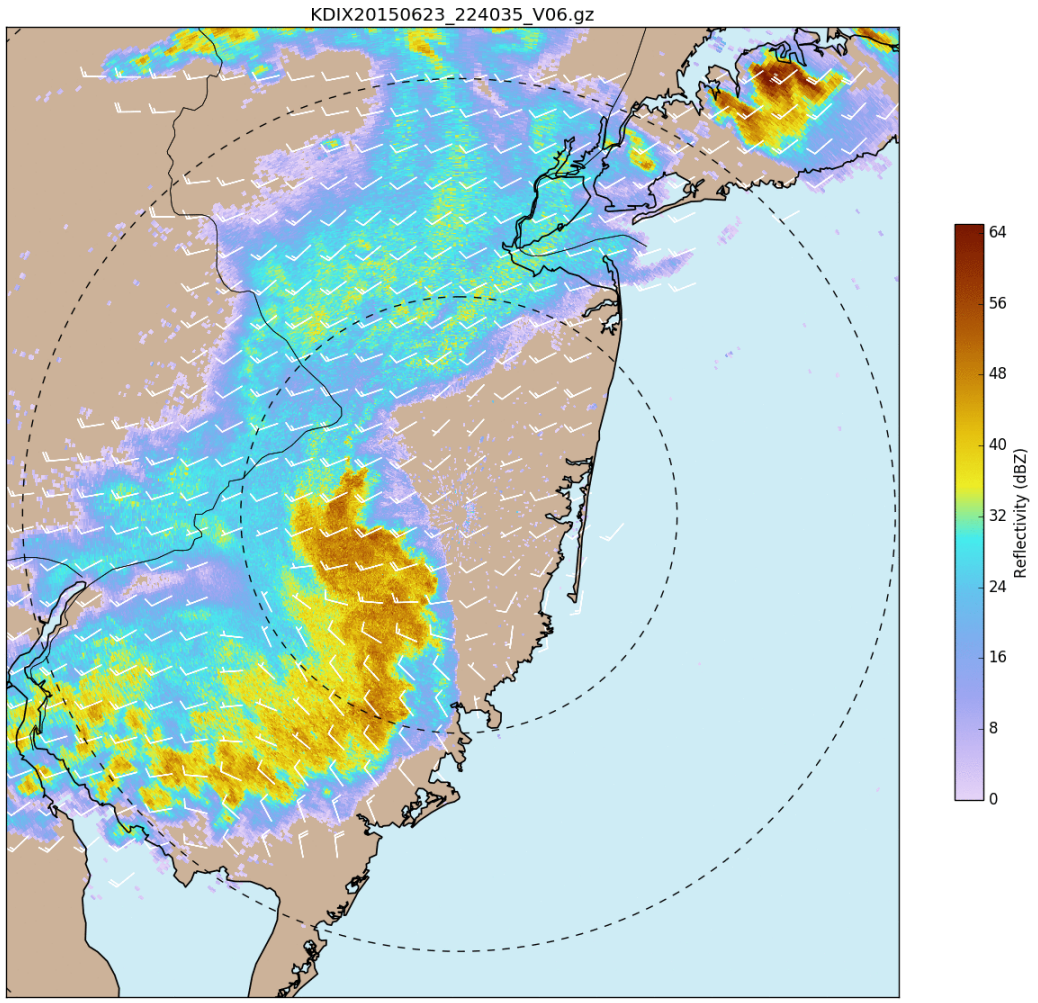
So how does this compare with a scatterometer?

Let’s test this with a boring case to start.

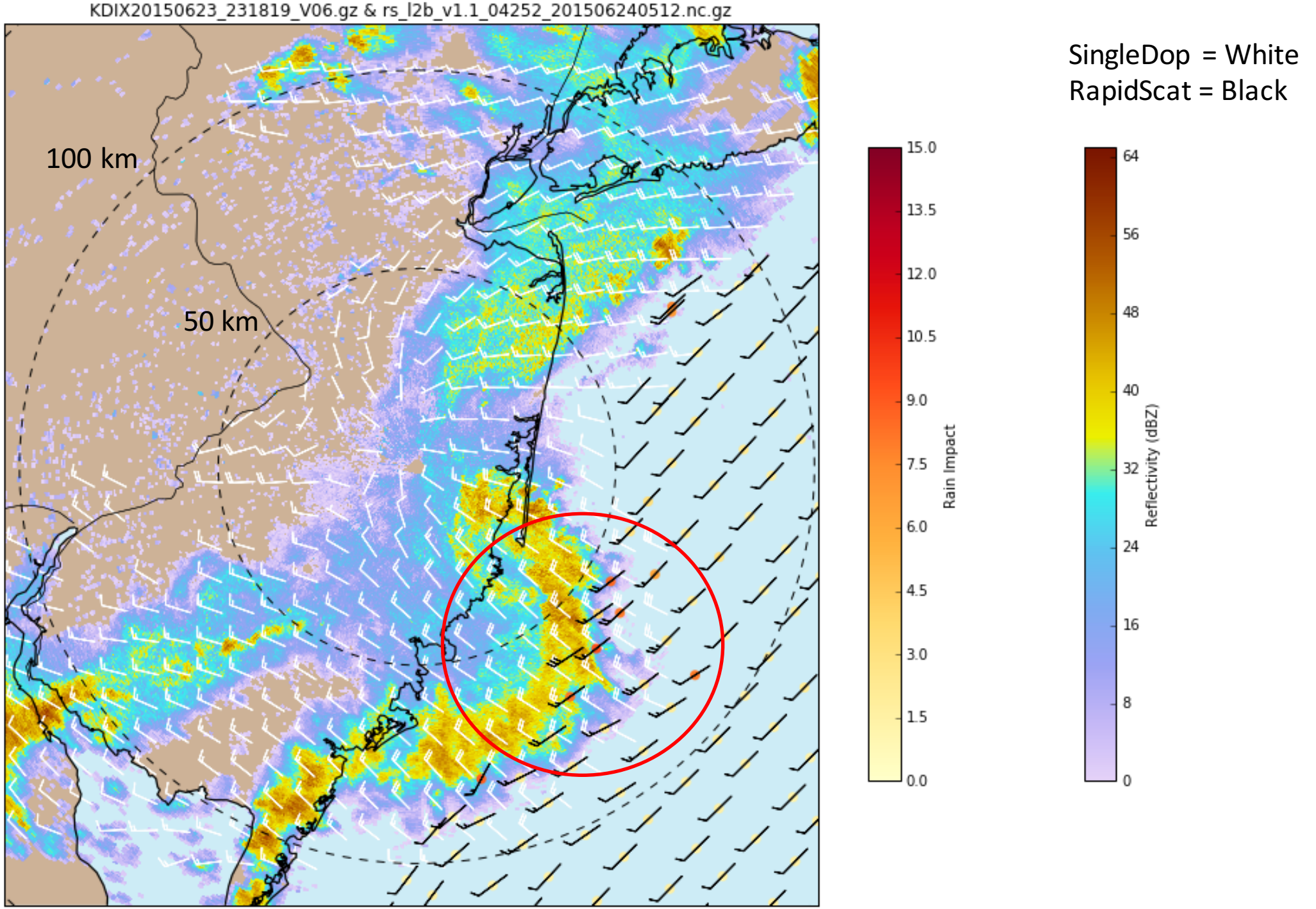



KHGX20150616_194258_V06.gz & rs_l2b_v1.1_04141_201506230125.nc.gz
100 km
50 km
SingleDop = White
RapidScat = Black
Rain Impact
15.0
13.5
12.0
10.5
9.0
7.5
6.0
4.5
3.0
1.5
0.0
Reflectivity (dBZ)
64
56
48
40
32
24
16
8
0

What about something a bit more dynamic?



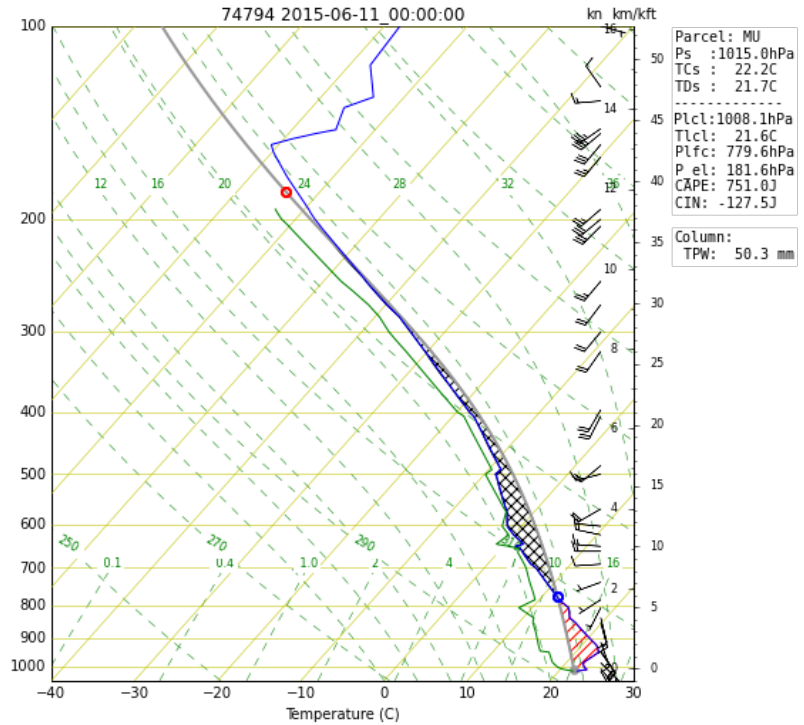
Offshore bow-echo system, anyone?

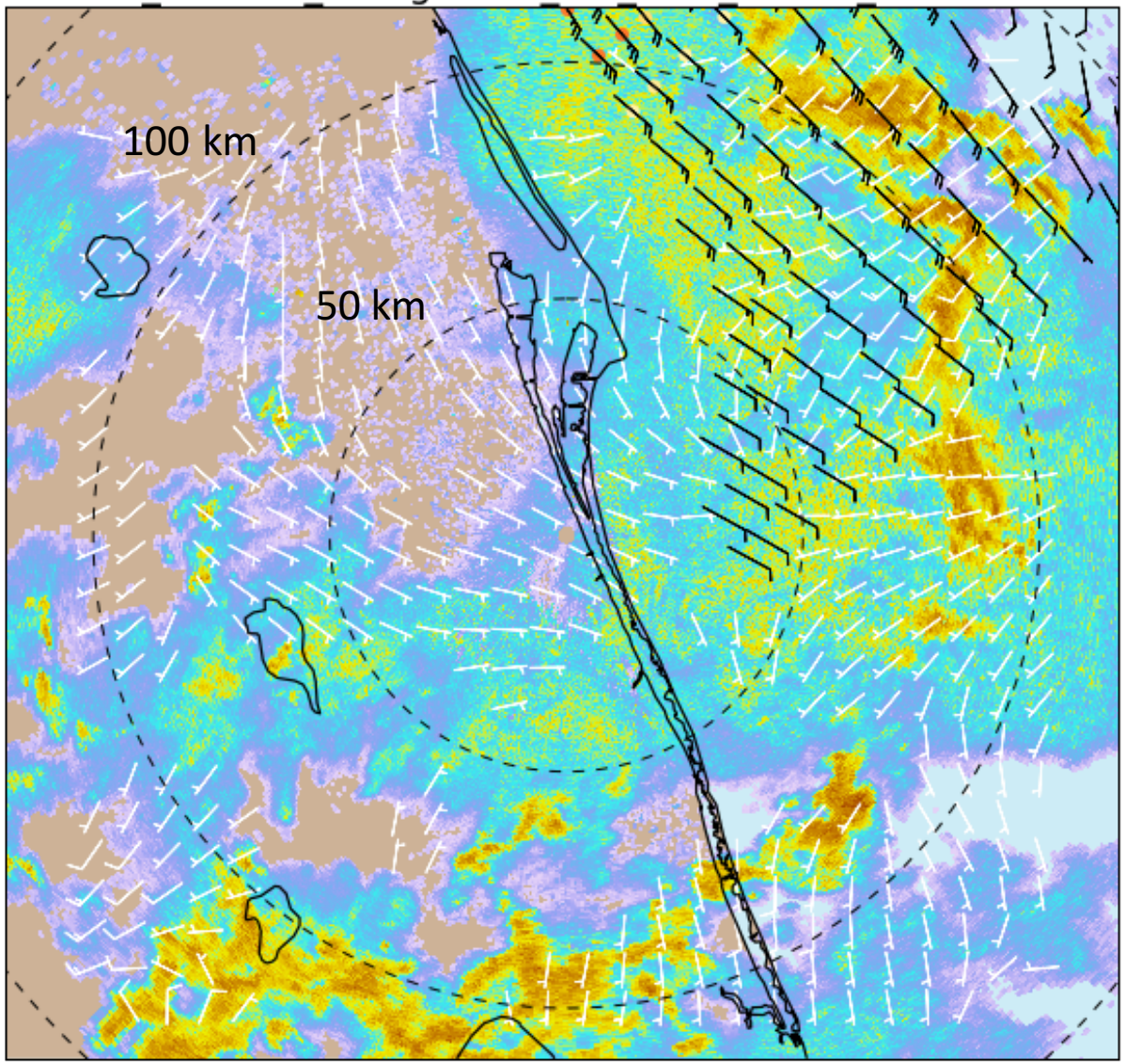

KDIX20150623_231819_V06.gz & rs_l2b_v1.1_04252_201506240512.nc.gz
100 km
50 km
SingleDop = White
RapidScat = Black
15.0
13.5
12.0
10.5
9.0
7.5
6.0
4.5
3.0
1.5
0.0
Rain Impact
64
56
48
40
32
24
16
8
0
Reflectivity (dBZ)

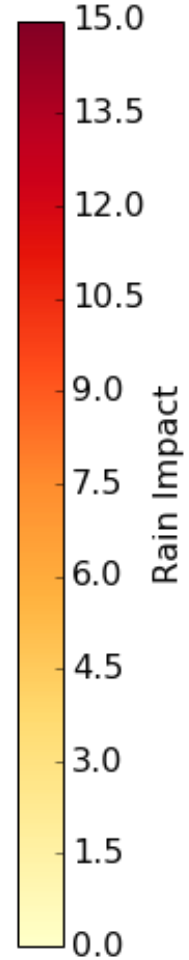
SingleDop = White
RapidScat = Black

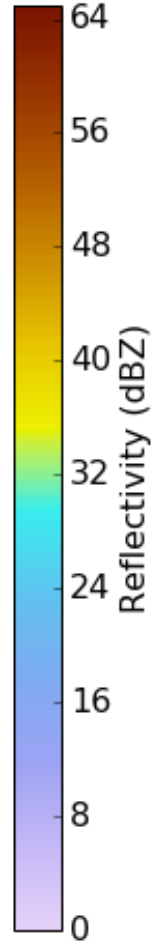
KMLB20150610_215007_V06.gz & rs_l2b_v1.1_04049_201506230020.nc.gz

Complementary Information!









Putting it all together

Let's take a brief look at last fall's South Carolina flood, from the offshore perspective.

<u>Radars</u>
KLTX (Wilmington) and KCLX (Charleston)

<u>Scatterometers</u>
RapidScat, ASCAT-A, and ASCAT-B

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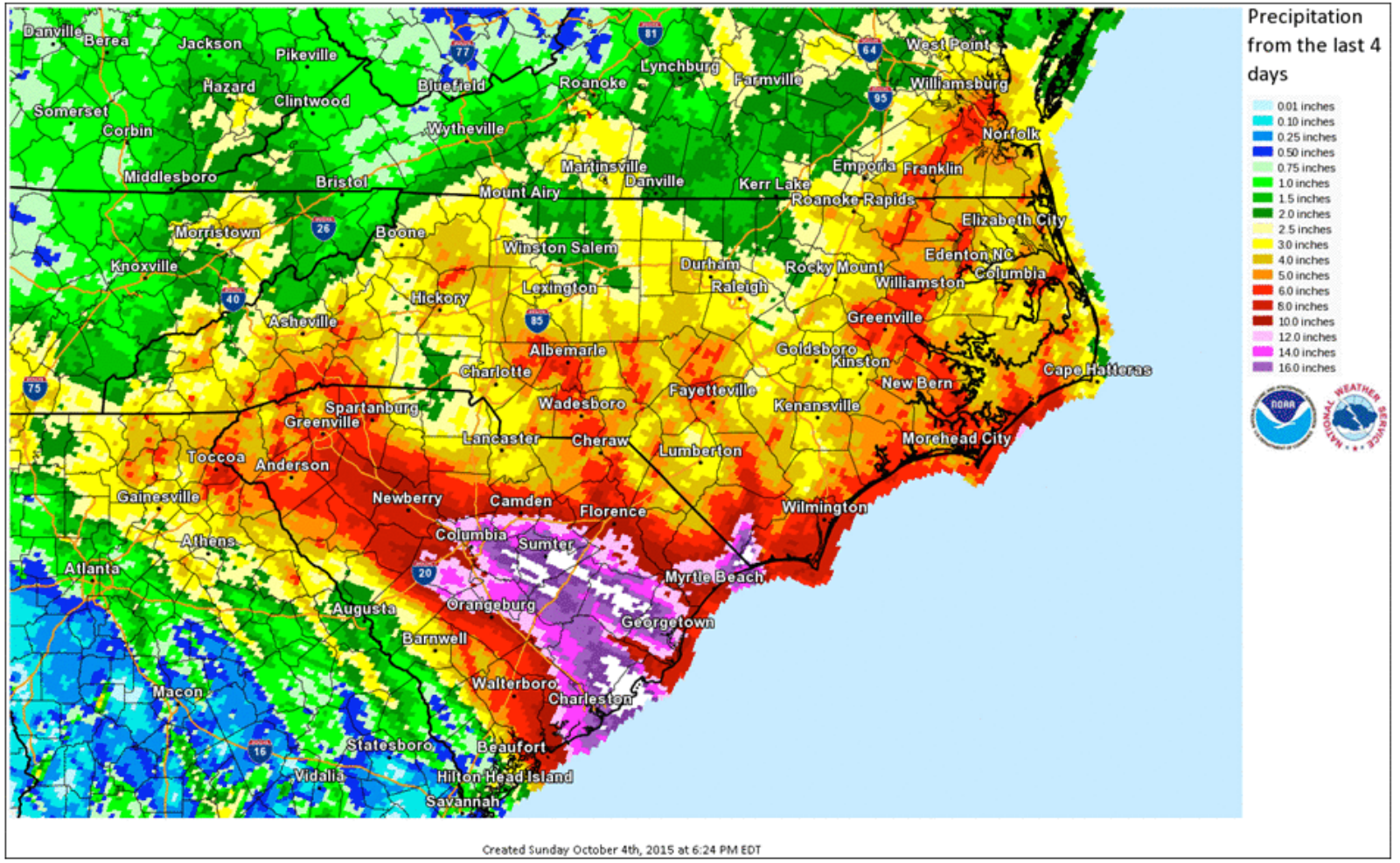
Rainfall from the last 4 days

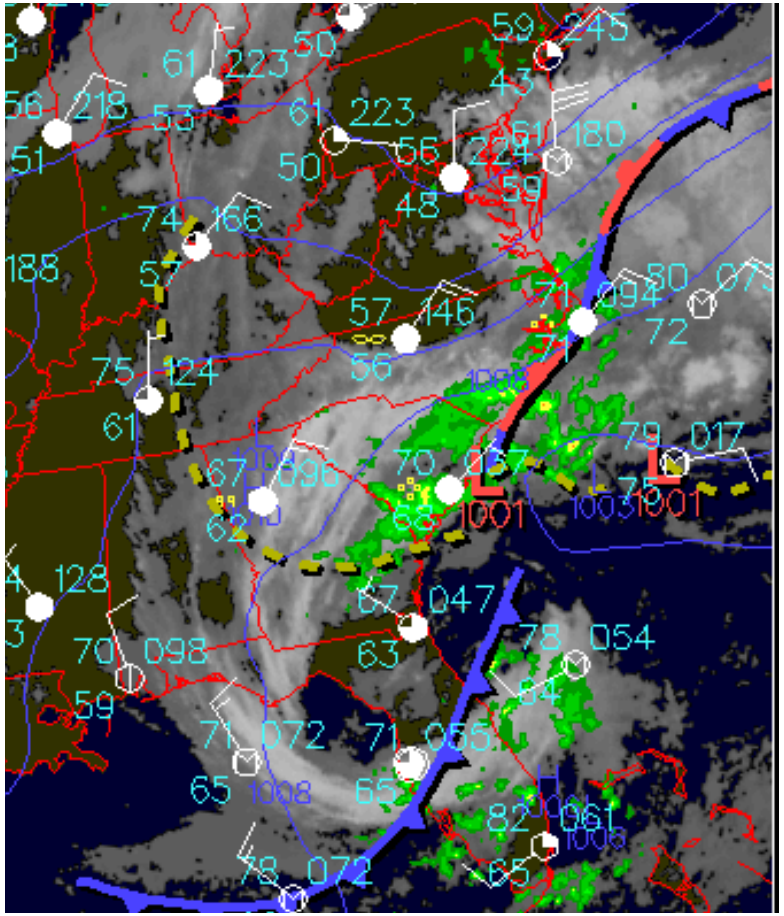


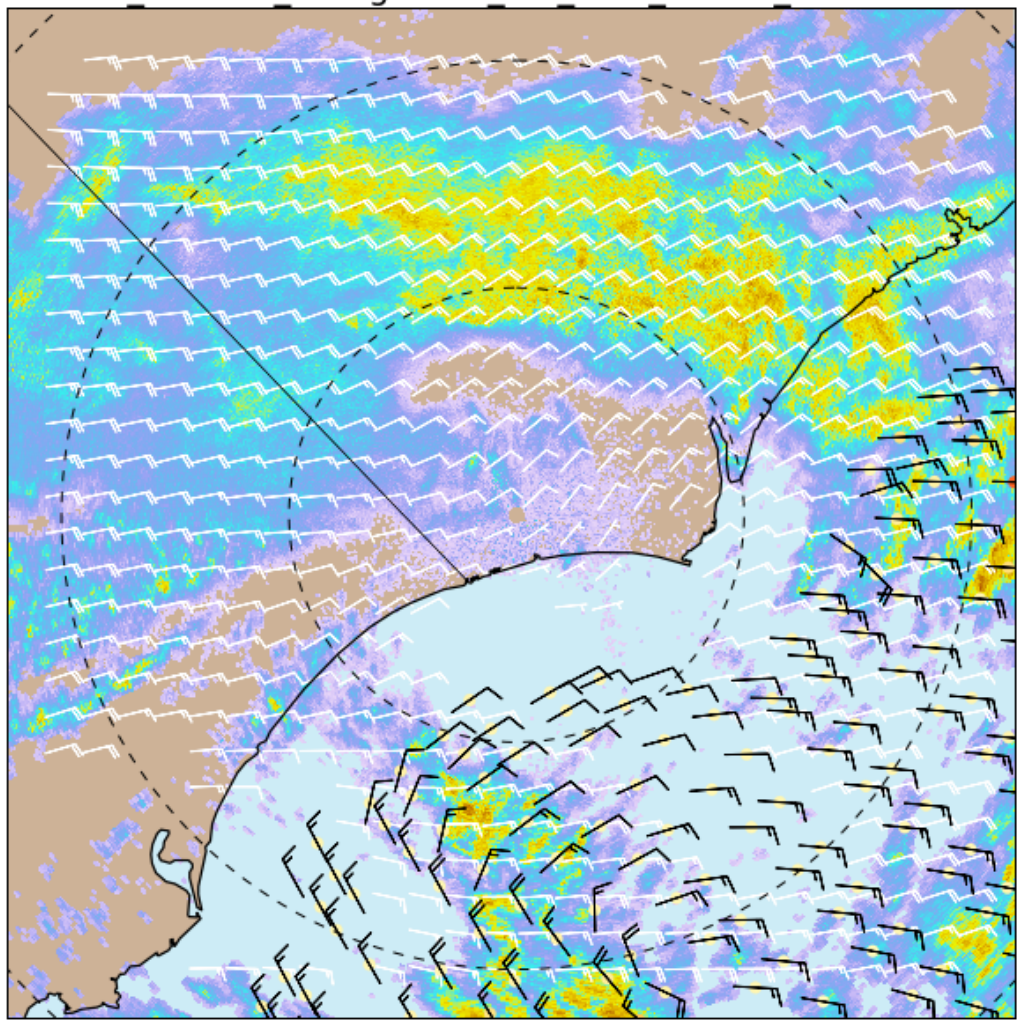
Published on: 10/04/2015 at 6:29PM

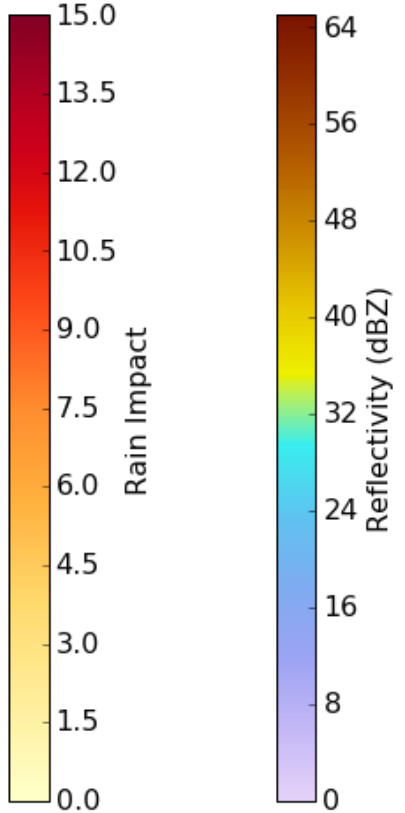
SingleDop = White
RapidScat = Black

10/04/2015, 2319 UTC

KLTX20151004_231922_V06.gz & rs_l2b_v1.1_05855_201510050540.nc.gz



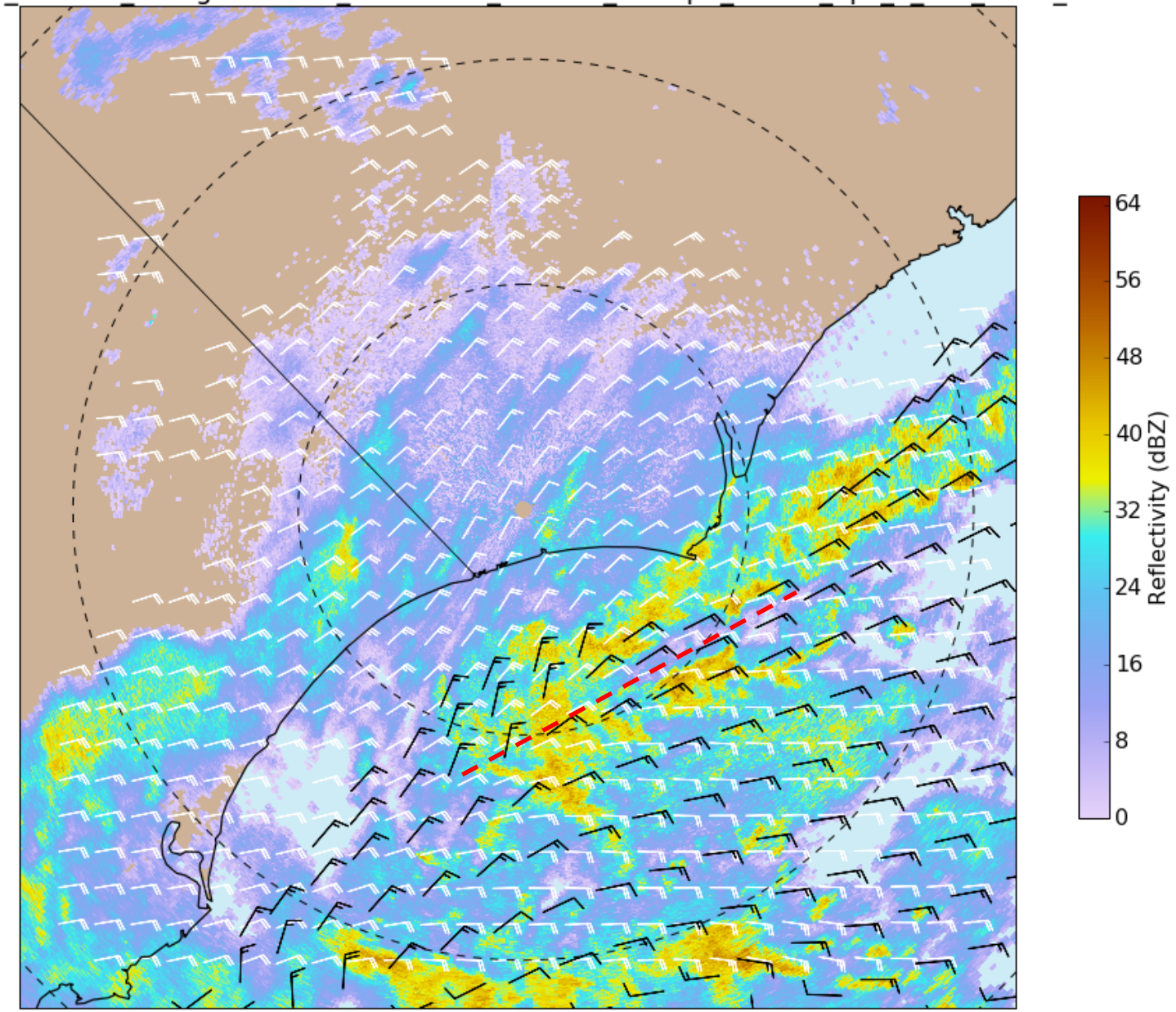


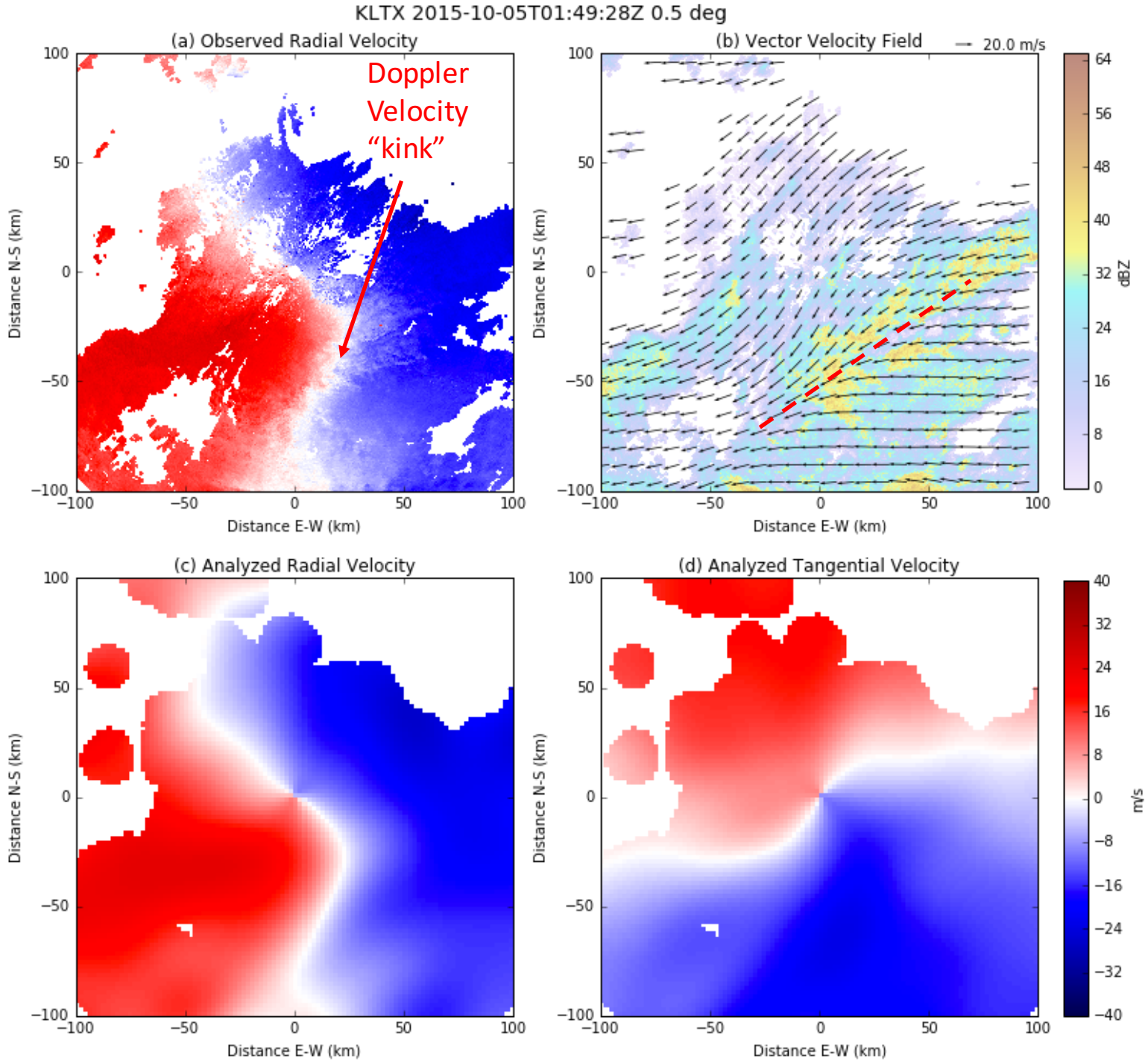


KLTX20151005_014831_V06.gz & ascat_20151005_014500_metopb_15804_eps_o_coa_2201_ovw.l2.nc.gz

10/05/2015, 0148 UTC

SingleDop = White
ASCAT-B = Black

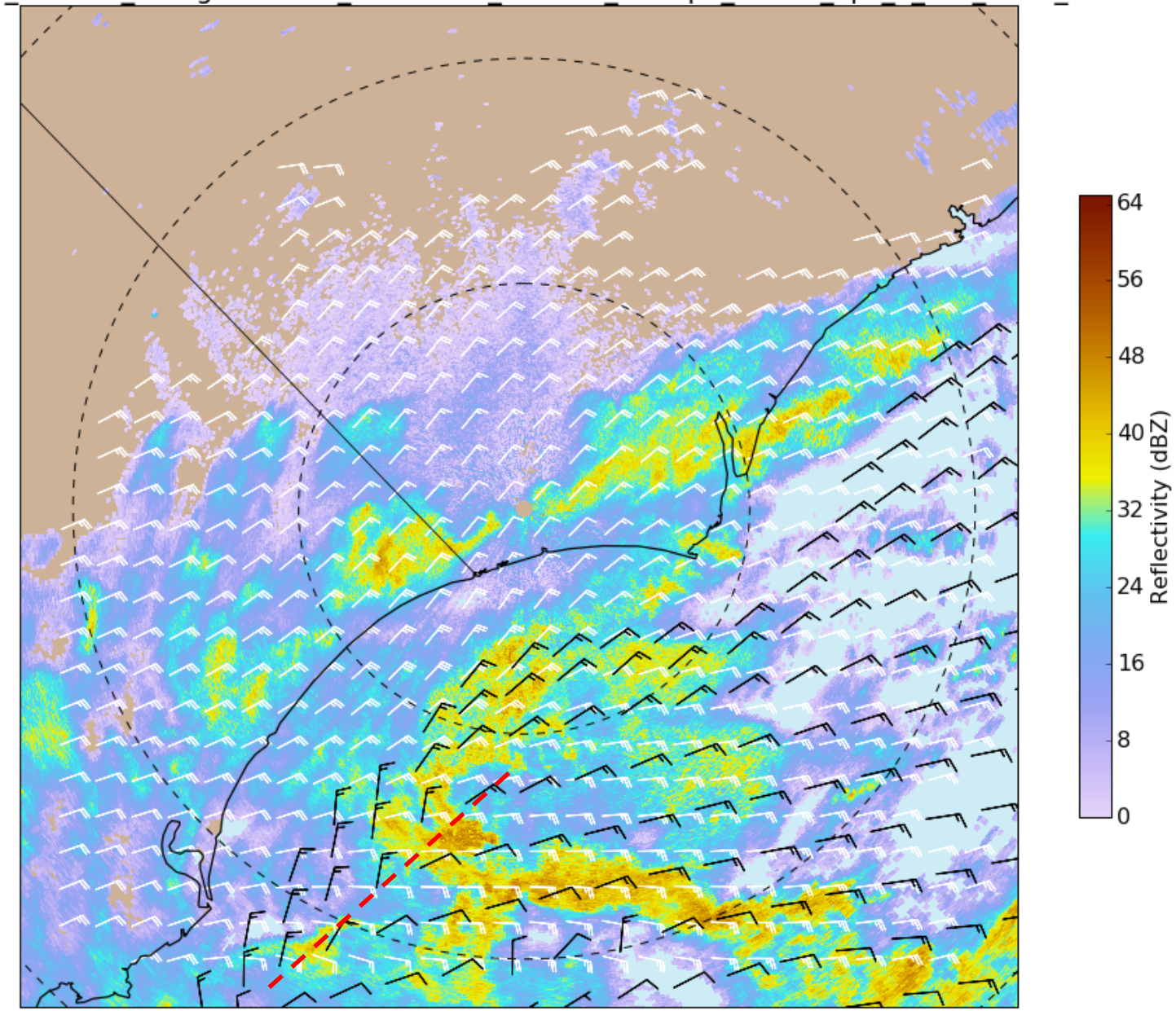



KLTX 2015-10-05T01:49:28Z 0.5 deg
(a) Observed Radial Velocity
Doppler Velocity "kink"
(b) Vector Velocity Field
20.0 m/s
(c) Analyzed Radial Velocity
(d) Analyzed Tangential Velocity
Distance N-S (km)
Distance E-W (km)
dBZ
m/s

KLTX20151005_023610_V06.gz & ascat_20151005_023000_metopa_46491_eps_o_coa_2300_ovw.l2.nc.gz

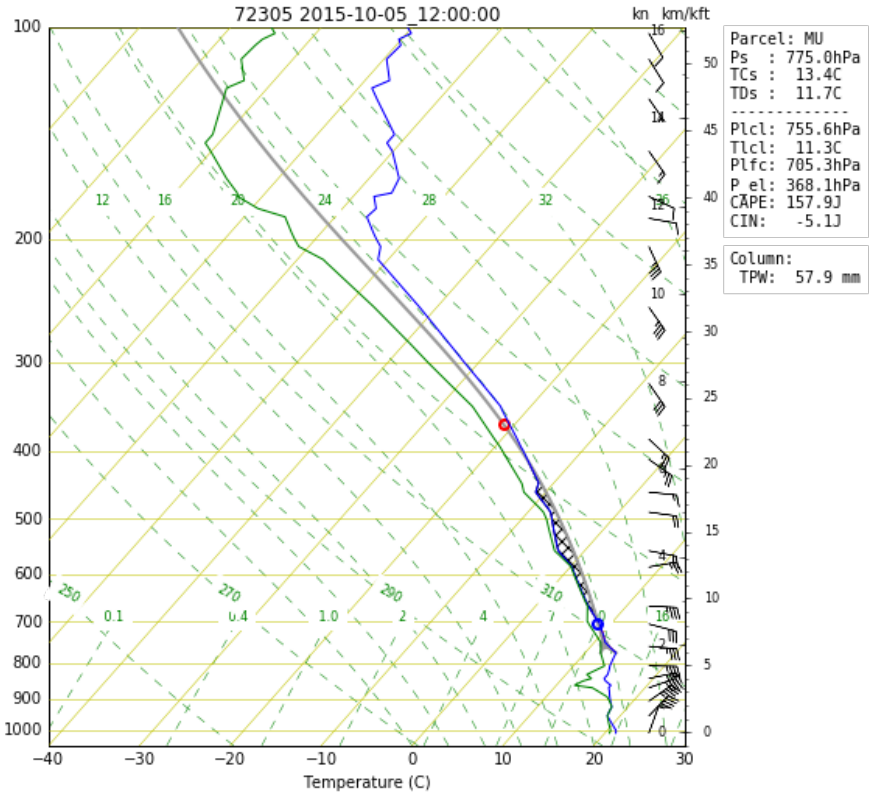
10/05/2015, 0236 UTC

SingleDop = White
ASCAT-A = Black



SingleDop = White
RapidScat = Black

10/05/2015, 0727 UTC



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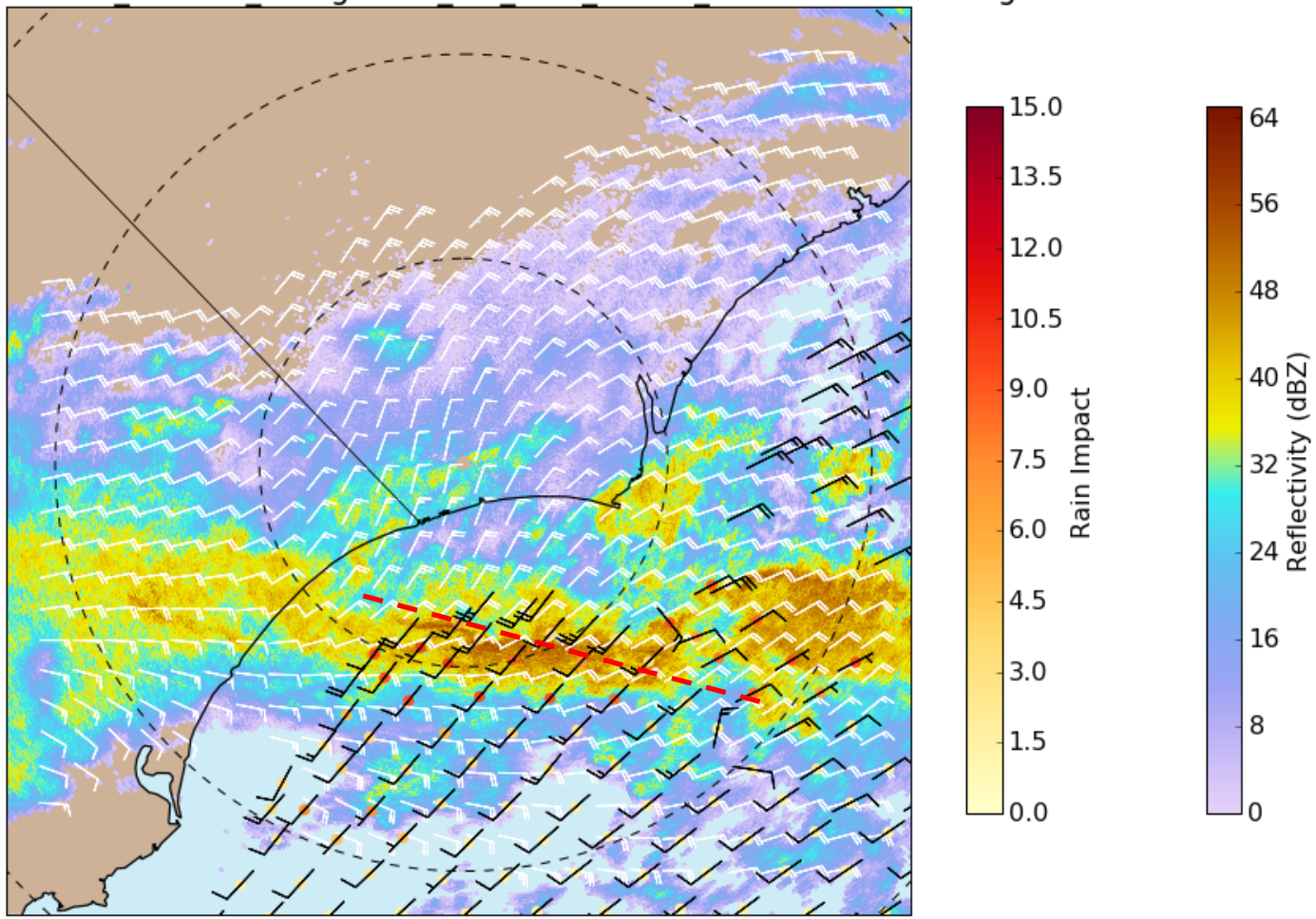
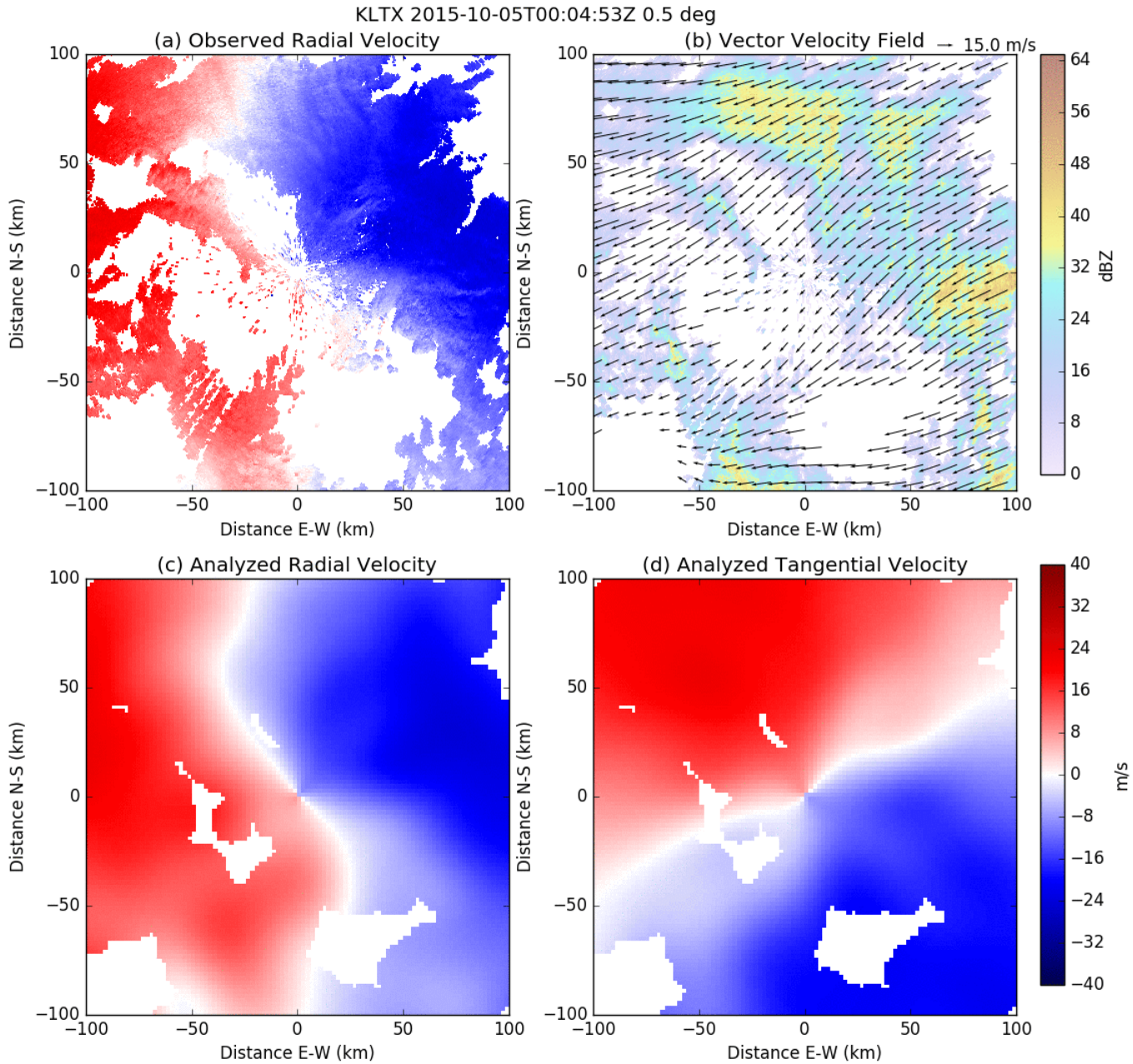
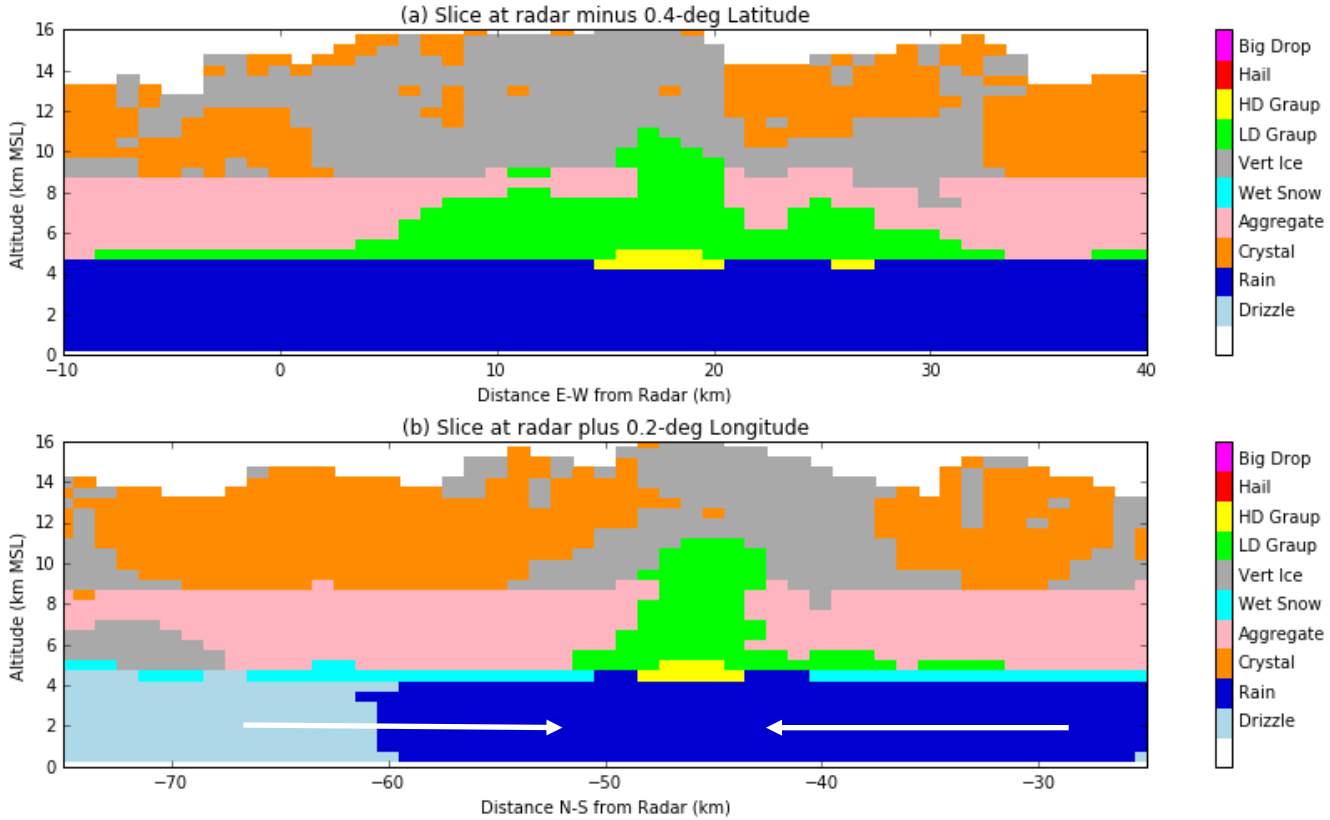
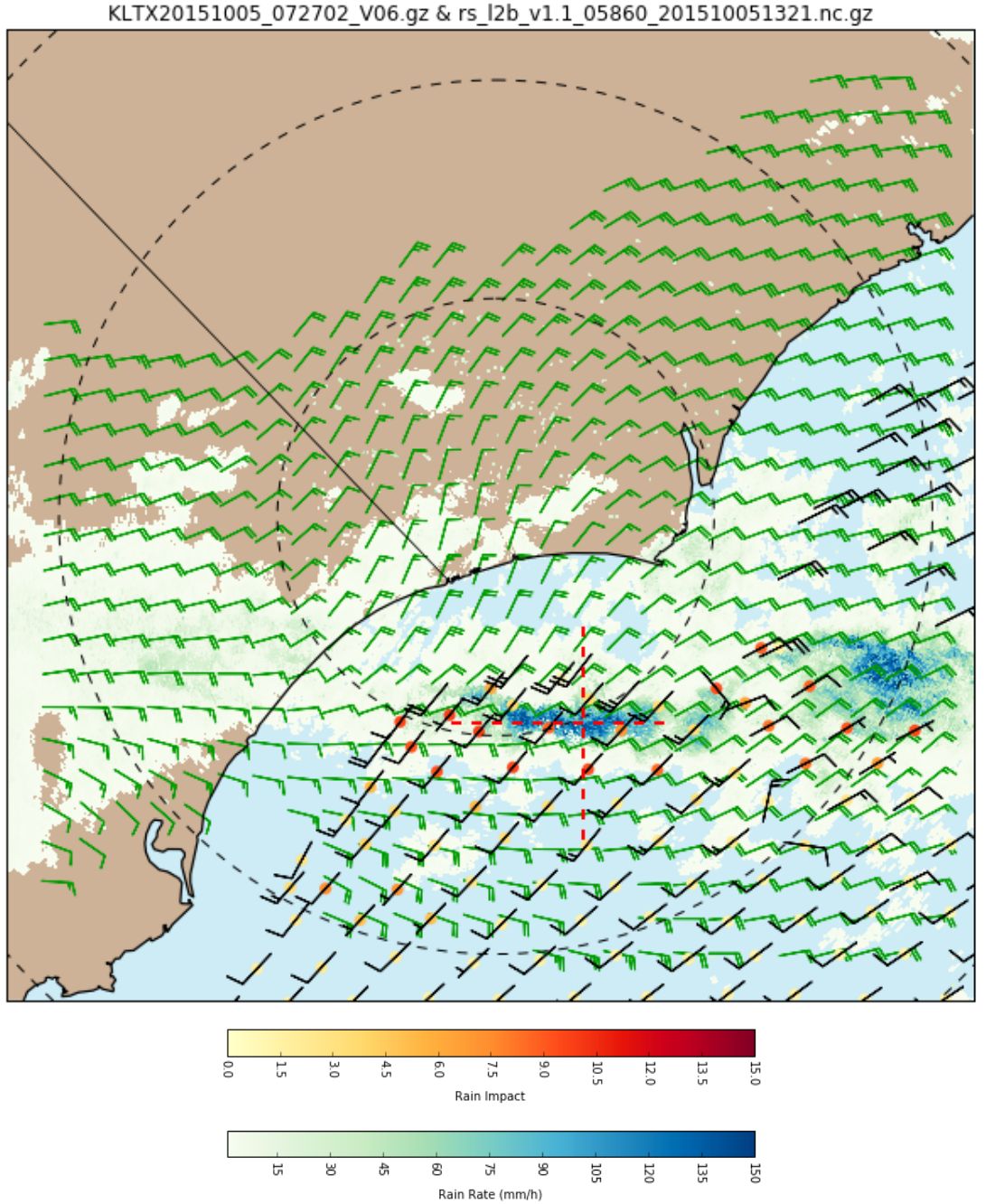




KLTX
00-08 UTC
10/05/2016

Blending in rainfall and microphysical information from polarimetric radar …





Conclusions

- Single-Doppler wind retrievals demonstrate value for evaluating scatterometer wind measurements near precipitation, and as a complementary source of wind information in concert with scatterometers

- Caveats must be kept in mind – scatterometer rain impacts, 10-m winds vs. 2D winds on conical PPI surface

- Examples demonstrate that scatterometers may be used to characterize mesoscale wind features that are helping organize precipitation systems, but proceed with caution!

- Multi-decade NEXRAD dataset now on Amazon Web Services, multi-year scatterometer data on OPeNDAP @ PO.DAAC. Hmm …